

Overgeneration Conditions & Environmental Redispatch

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Idaho Legislative Interim Committee on
Energy, Environment and Technology

July 13, 2011



ENVIRONMENTAL REDISPATCH AND NEGATIVE PRICING POLICIES

- Environmental Redispatch is designed to ensure BPA is taking all reasonable efforts to meet its legal responsibilities under the Clean Water Act (“CWA”), Endangered Species Act (“ESA”), and court order, as well as BPA’s legal obligations under its authorizing legislation, such as the Pacific Northwest Electric Power Planning and Conservation Act (“Northwest Power Act”), the Federal Columbia River Transmission System Act (“Transmission System Act”), the Pacific Northwest Power Preference Act (“Preference Act”), and the Bonneville Project Act.

ENVIRONMENTAL REDISPATCH AND NEGATIVE PRICING POLICIES

- Environmental Redispatch will help provide options for BPA to maintain system reliability by balancing loads and resources within BPA's Balancing Authority Area while meeting BPA's environmental and statutory responsibilities.
- When system conditions trigger Environmental Redispatch, BPA will replace scheduled generation in BPA's Balancing Authority Area with Federal hydropower at no cost. However, BPA will not pay negative energy prices under these conditions.

System Priorities in the Context of ER

- Preserve system reliability
- Safeguard fish
- Avoid cost shifts to BPA customers
- Support renewable integration

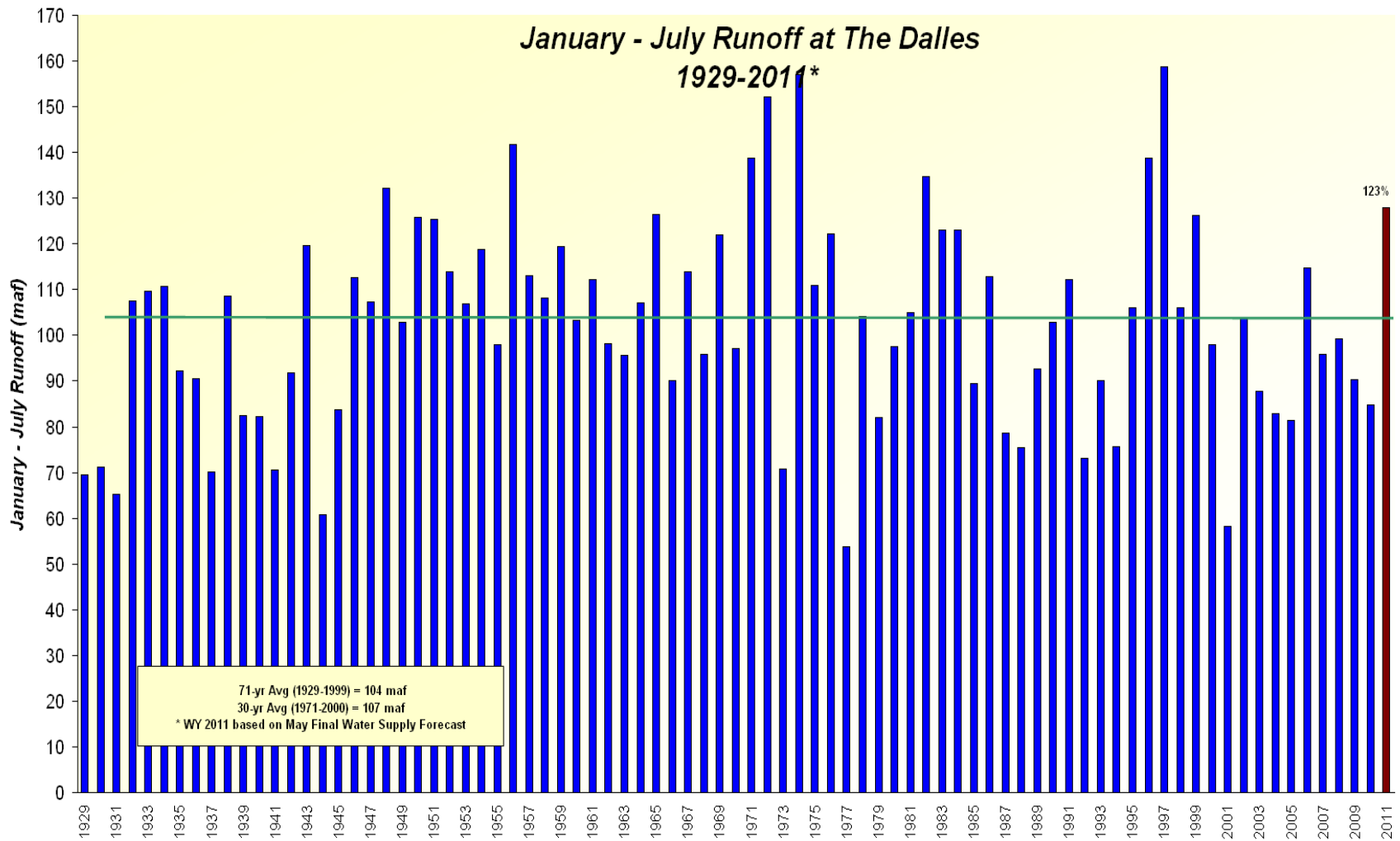
Background

- **We had identified and have been discussing this potential issue with regional wind development interests since 2008.**
- **Reliability dictates that we must constantly balance load and resources to equal one another.**
- **PNW hydro generation by itself at times overwhelmed capability of the system and saturated PNW markets during high run-off periods. Adding 6000 MW of wind that randomly generates during the springtime to this same regional system, magnifies the problem.**
- **Judge Redden's April 21, 2010 court order regarding this spring's operations included the 2010 Fish Operations Plan, that states in part:**

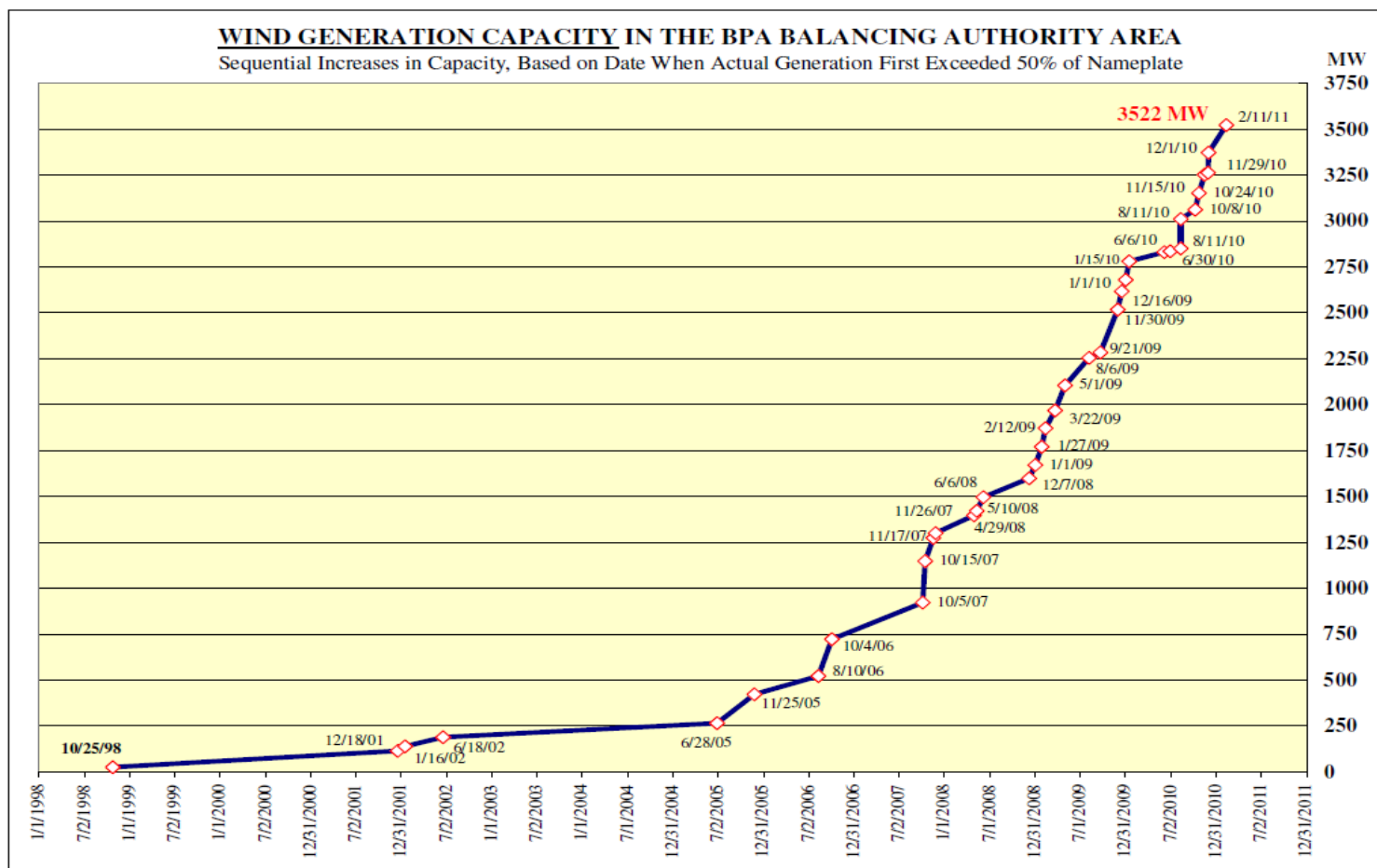
Management of Spill for Fish Passage

"The Corps will manage spill for fish passage to avoid exceeding 120% TDG in project tailraces, and 115% TDG in the forebay of the next project downstream consistent with the current State of Washington TDG saturation upper limits. These levels are referred to as "gas caps." The project maximum spill discharge level that meets, but does not exceed the gas cap, is referred to as the "spill cap.""

Chronological Jan-July

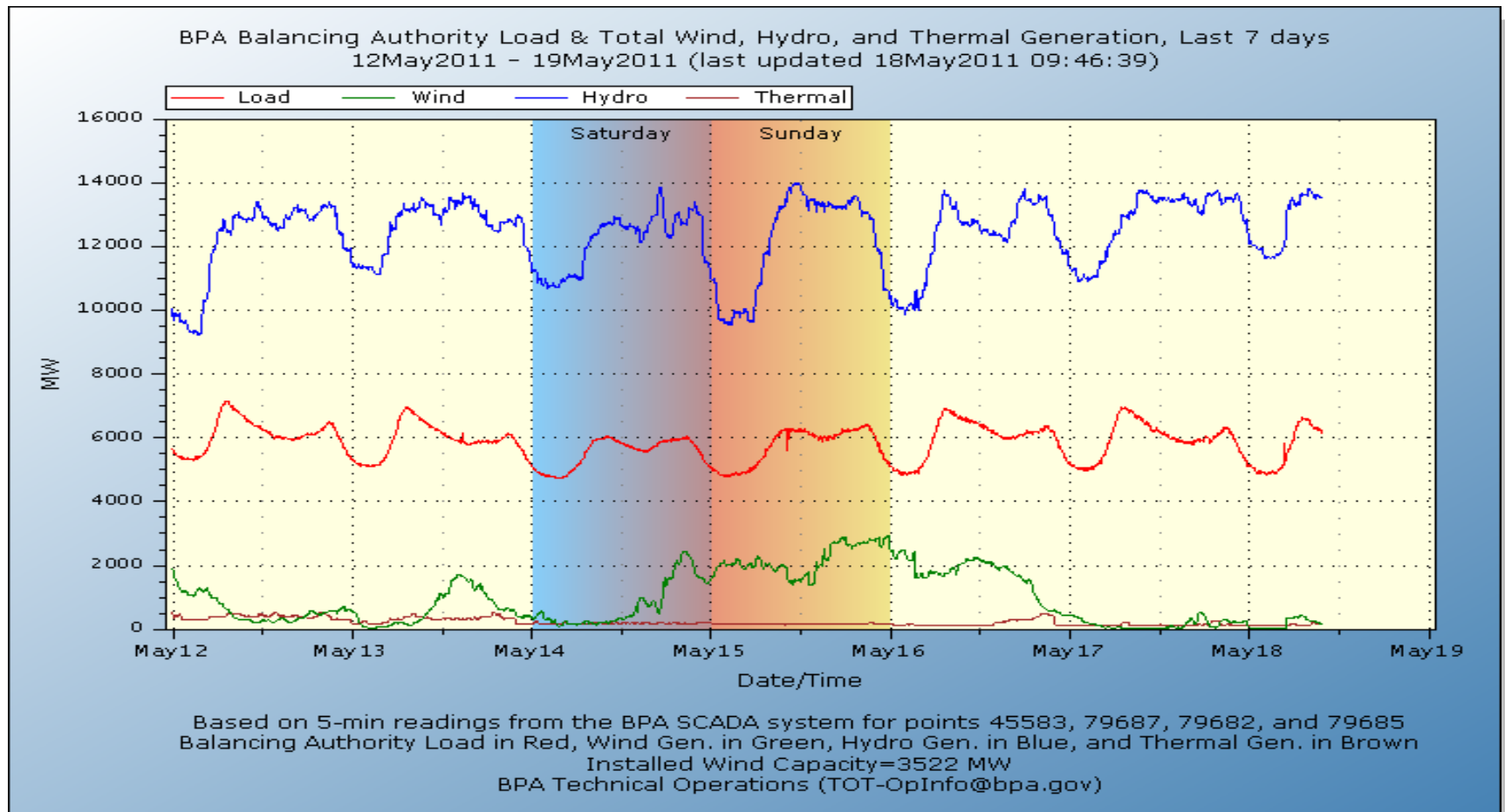


Wind Power is Growing Fast



WIND_InstalledCapacity_current.xls 3/15/2011

Current Conditions BPA Balancing Authority



Transmission and Load Limitations

- **Limits on extra-regional transfers**
- **At times there is insufficient market in BPA's Balancing Authority to absorb all wind and hydro**

Rapid Growth of Wind Generation

State Renewable Standards

Montana

- 5% for 2008 - 2009
- 10% for 2010 – 2014
- 15% for 2015 and beyond

Washington

- 3% by 2012
- 9% by 2016
- 15% for 2020 and beyond

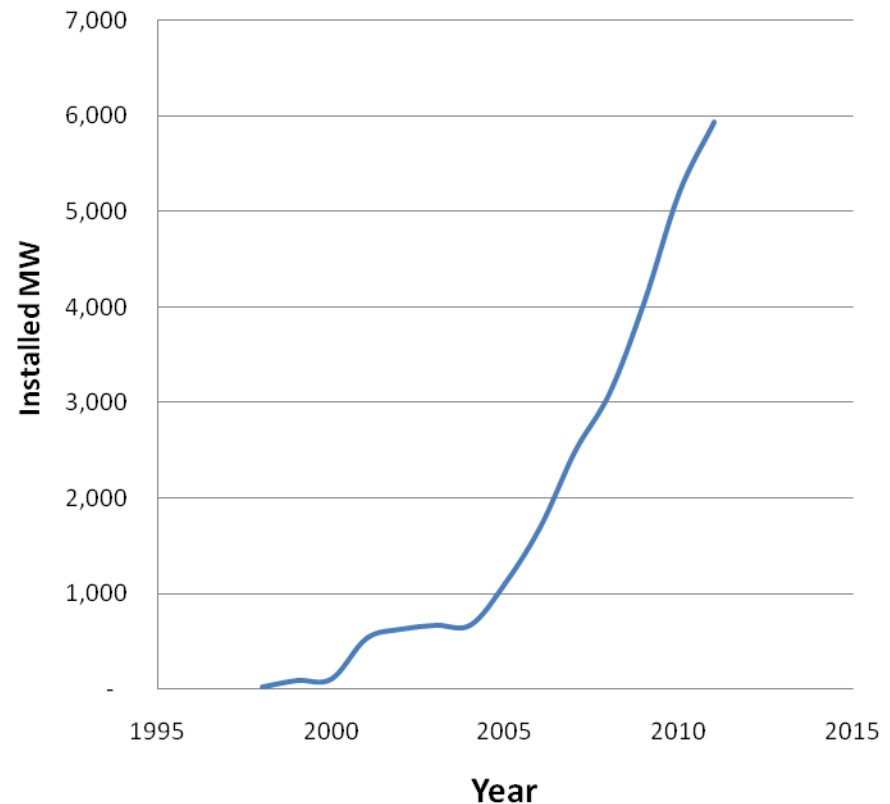
Oregon

- 5% by 2011
- 15% by 2015
- 20% by 2020
- 25% for 2025 and beyond

California

- 20% by 2013
- 25% by 2016
- 33% by 2020

Cumulative Northwest Wind Generation

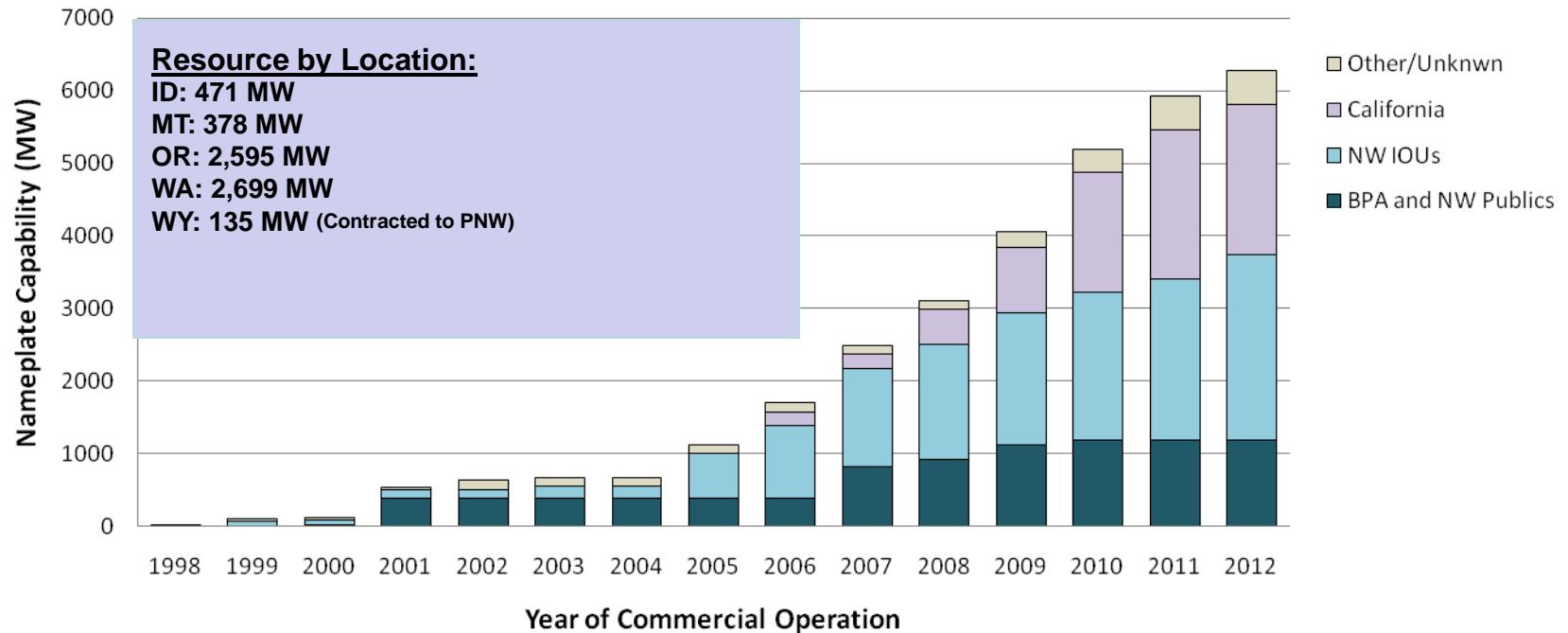


Q:\KD\Data Responses\[Wind Additions by Year in PNW.xlsx]

Breakdown of NW Wind Generation

NW Wind by Ownership

In operation or under construction, June 2011



\\nas1\Power\KD\Wind Integration Forum\Steering Committee\Mtg 6-6-11\Regional Wind Breakdown.xlsm\Breakdown

Incenting Displacement - Thermal Resources

- **Thermal resources will generally displace at an energy price that is equal to-or-less than their fuel cost**
- **Unless:**
 - **reliability reasons, such as to supply balancing reserves**
 - **The availability of displacement power is uncertain and start stop costs could exceed fuel savings**
 - **They have mandatory fuel use constraints**

Incenting Displacement - Wind

- **Zero fuel cost**
- **Production tax credit ~ Federal**
- **Renewable energy credits ~ States**
- **The energy price to displace a resource receiving these credits is negative, meaning that the seller of power would have to pay the wind resource owner to be displaced**

Economic and Environmental Benefit Estimates

- Economic Benefits:
 - \$30 to \$60 million annual tax revenues
 - \$12 to \$30 million annual royalty payments
 - 350 to 650 new permanent jobs
 - Average of ~300 temporary construction jobs each year
 - \$12 billion capital investment

National Renewable Energy Laboratory. Jobs and Economic Development Impact (JEDI) Wind Model. July, 2009. Available from: http://www.nrel.gov/analysis/jedi/about_jedi_wind.html. and Costanti, Mike and Beltrone, Peggy. US Department of Energy and National Renewable Energy Laboratory. Wind Energy Guide for County Commissioners. November, 2006. Available from: <http://www.nrel.gov/docs/ty07osti/40403.pdf>.

U.S. Environmental Protection Agency (EPA). eGRID2010 Version 1.0 Year 2007 GHG Annual Output Emission Rates. http://www.epa.gov/cleanenergy/documents/egridzips/eGRID2010V1_0_year07_GHGOutputRates.pdf

Q:\KDWind Integration Forum\Steering Committee\Mtg 6-6-11\Wind Additions and Econ Impacts by Year in PNW (2).xlsx

Economic and Environmental Benefit Estimates

- Environmental Benefits:
 - CO₂ emissions reduced nearly 30 million tons
 - 2011 reduction equivalent to removing 1 million cars.
 - Nitrogen oxide emissions reduced 450 tons

The Cost Ledger

- ▶ Utility procurement costs and associated rate impacts.
- ▶ Wind integration charges and balancing costs.
- ▶ Increasing wind generation lowering wholesale energy prices.
 - Lower prices benefit short buyers, hurt long sellers
 - Council analysis suggests RPS resources reduce annual average wholesale market prices by 4-8%, as much as 20% during the spring.
- ▶ Possible increased wear and tear on balancing units, especially hydro.
- ▶ A better understanding of these impacts requires additional information and analysis.

FCRPS Spill

- **Total Dissolved Gas (TDG)**
 - High TDG levels can result in gas bubble trauma in fish
 - Clean Water Act allows for spill levels up to 110% TDG.
- **TDG Waiver Process**
 - The Corps requests a “waiver” from Oregon and a “criteria adjustment” from Washington which allows greater levels of TDG in the system for Biological Opinion spill.
- **Water moved through hydro turbines produce significantly less TDG than spill**
- **The FCRPS will be operated to meet the standards set forth in the Clean Water Act and any related waivers.**
- **OR (120%) and WA (115%) forebay TDG standards. Changing to the OR standard would not have a material effect on solving this issue.**

ER Triggering Events/Actions

- **Operational actions BPA would evaluate prior to Environmental Redispatch (ER) include:**
 - Sales through bilateral marketing
 - Cutting prescheduled PNCA storage
 - Deferring scheduled generation and transmission maintenance activities
 - Increased pumping into Banks Lake at Grand Coulee
 - Seeking flow reductions with BC Hydro
 - Seeking access to additional reservoir storage space at Federal Projects
 - Generation Reductions at Columbia Generating Station
 - Implementing additional spill at FCRPS projects per USACE spill priority list within gas standards.
 - Reduce available Balancing Reserves to maximize turbine flows
 - Offer spill exchanges with other hydro systems
- **BPA will offer free energy in the market to assure that all possible hydro generation is taken prior to ER**
- **BPA will spill to TDG caps prior to ER. This typically is 1000's of MW of power.**
- **BPA will reduce all BA thermal generation to minimum generation levels prior to ER.**
- **If BPA predicts that these actions collectively will be insufficient to manage spill past unloaded turbines, and therefore TDG, BPA would initiate ER.**
- **ER reduction of wind only happens as a last resort after hydro is spilled to gas caps and thermal is reduced**

Environmental Redispatch

- **Non-carbon producing hydro power replaces the planned wind schedules each hour so that wind can meet its planned energy deliveries without interruption.**
- **Hydro power is supplied free of charge**
- **ER is terminated as soon as conditions allow**
- **Adopted as an interim policy**

Three Interrelated Challenges

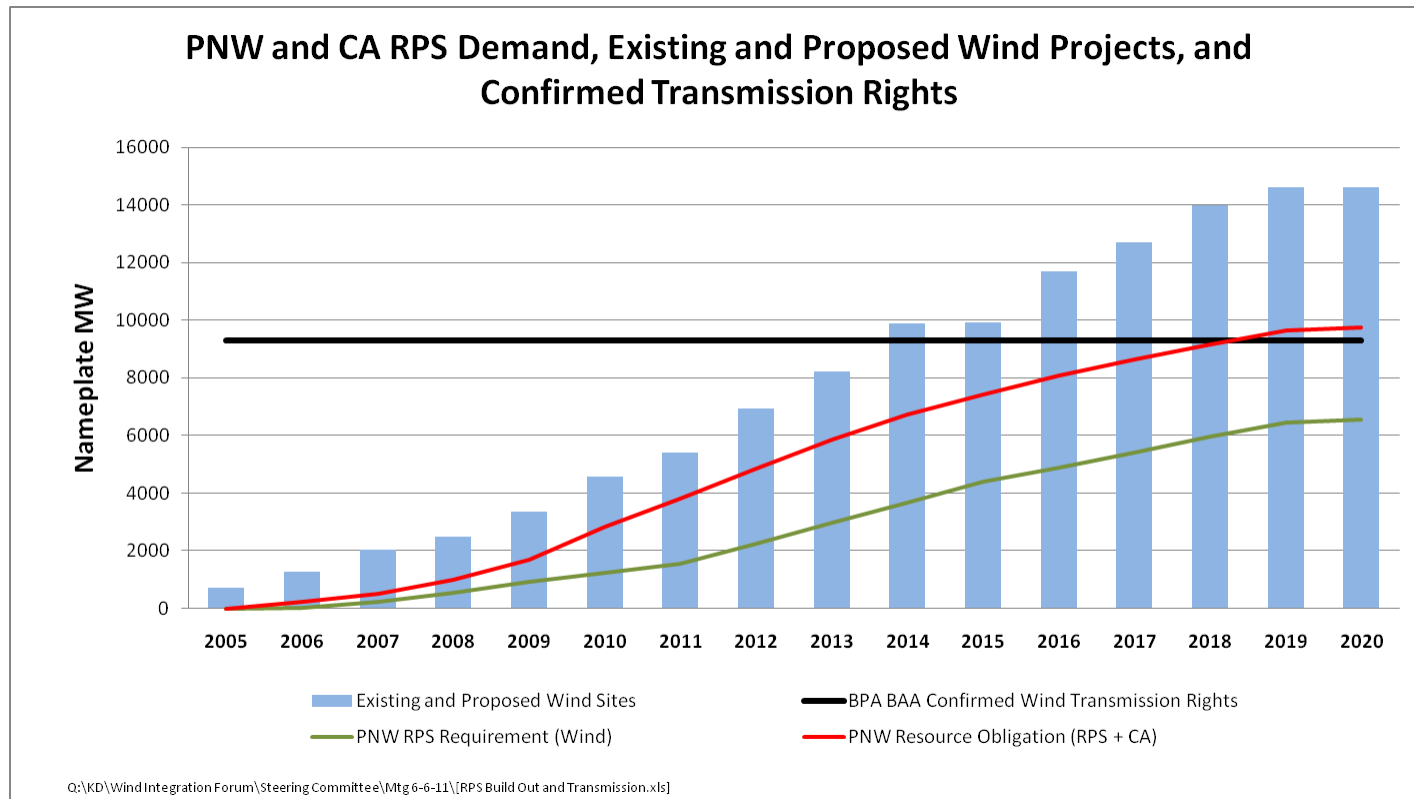
- Provision of Balancing Services
 - How can we manage wind variability in a reliable, efficient manner while recognizing the limits on the region's hydro flexibility?
- Oversupply
 - How can we reliably and equitably manage high hydro/high wind conditions?
- System Flexibility
 - How much do we have, how much will we need?

Potential Long Term Solutions

- **PNW overgeneration supply conditions will continue to coincide with high water and wind events during low load periods**
- **Extremely costly infrastructure solutions such as new high voltage interties or storage facilities will need to be carefully considered as solutions**
- **Potentially develop seasonal intermittent loads**
- **Legislative solutions that support continued payment of RECs and PTCs for ER displaced generation may present the least cost solution**
- **BPA plans to continue to engage regional interests to find the best long term solution for the region**

Wind Resources to 2020

- PNW and CA RPS targets would require ~10,000 MW of installed NW wind by 2020.
 - Nearly 6,000 MW currently operating or under construction.
- At least 14,400 MW of supply between existing projects and interconnection requests.
 - Significant excess supply relative to 2020 regulatory demand.
 - BPA has offered ~ 9,300 MW of transmission service to wind projects.



Web Links

- View load and hydro, wind and thermal generation:
<http://www.transmission.bpa.gov/Business/Operations/Wind/baltwg.aspx>
- View transmission system status, including real-time displays of utilization along major transmission paths:
<http://transmission.bpa.gov/business/operations/intertie/default.aspx>
- View river conditions, including total dissolved gas (TDG) conditions:
http://www.cbr.washington.edu/dart/hgas_com.html
- View wind conditions:
<http://transmission.bpa.gov/Business/Operations/Wind/WindAnimation.aspx>
- View wind generation forecast, BPA's new tool showing likely wind generation output for the next 72 hours:
<http://transmission.bpa.gov/Business/operations/Wind/forecast/forecast.aspx>
- View regional weather forecast: <http://www.wrh.noaa.gov/pqr/>. Link to this site to find current conditions, water and snow reports, climate data.